Claims

1. (Original) A position sensor comprising:

a frame;

a spool rotatably mounted to the frame;

a cable windable about the spool and having a distal end adapted to be affixed to an object to be sensed, wherein the spool rotates as the cable winds and unwinds in relation to movement of the object, the spool operable to travel along a substantially linear path in response to the rotational movement of the spool;

and a sensing means adapted to sense the position of the spool along its substantially linear path.

2. (Original) The position sensor of claim 1 wherein the sensing means includes a Hall-effect transducer operably disposed to a target magnet movable in cooperation with the movement of the spool.

3. (Original) The position sensor of claim 2 wherein the Hall-effect transducer is mounted to the exterior of said frame.

4. (Original) The position sensor of claim 1 wherein the spool travels along a linear path that is parallel to the rotational axis of the spool.

5. (Original) The position sensor of claim 1 wherein the spool has a threaded engagement with the frame to cause the linear travel of the spool as the spool rotates.

6. (Original) The position sensor of claim 1 wherein the spool has a threaded extension that is threadedly engaged with a threaded opening in the frame.

7. (Original) The position sensor of claim 6 wherein the frame has a bushing having threads formed therein and the threaded extension has mating threads.

8. (Original) The position sensor of claim 1 wherein the pitch of the threaded engagement causes the spool to travel a distance along its linear path about the width of the cable for each 360 degrees of rotation of the spool.

9. (Original) The position sensor of claim 6 wherein the sensor includes a backlash mechanism to prevent backlash within the threaded engagement between the threaded extension and the frame.

10. (Original) The position sensor of claim 9 wherein the backlash mechanism comprises a spring adapted to create a constant bias on the threaded extension to force the threaded extension against the threaded opening in the frame to prevent backlash therebetween.

11. (Cancelled) The position sensor of claim 9 wherein the backlash mechanism comprises a spring adapted to create a constant bias on the rotatable spool to force the threaded extension against the threaded opening in the frame to prevent backlash therebetween.

12. (Original) The position sensor of claim 10 wherein the sensing means comprises a sensor affixed to the arm to sense the position of the spool.

13. (Original) The position sensor of claim 12 wherein there is a magnet affixed to the frame and the sensor comprises a Hall effect sensor that cooperates with the magnet to sense the position of the arm.

14. (Original) The position sensor of claim 1 wherein a recoil spring biases the rotational movement of the spool to cause the cable to wind up on the spool.

15. (Original) The position sensor of claim 14 wherein the recoil spring has one end affixed to the rotatable spool and another end is fixed with respect to the frame.

16. (Original) The position sensor of claim 1 wherein the recoil spring is a spiral spring having an outer end and an inner end and wherein the outer end is affixed to the rotatable spool and the inner end is fixed with respect to the frame.

17. (Original) The position sensor of claim 1 wherein the inner end of the spiral spring is affixed to a hub that is rotatably fixed with respect to the frame but is movable linearly along with the linear travel of the spool.

18. (Original) The position sensor of claim 17 wherein the spool has a hollowed out area and the spiral spring is located within the hollowed out area within the spool.

19. (Original) The position sensor of claim 18 wherein a cover plate covers the hollowed out area enclosing the spiral spring within the spool.

20. (Original) A position sensor, comprising a frame, a spool rotatably affixed within the frame about a central axis of rotation, a feed point opening in said frame located in close proximity to the spool, and a cable passing through the feed point opening and adapted to be wound around the spool to form a plurality of individual windings adjacent to but not overlapping each other, the spool adapted to move linearly along its axis of rotation as the cable is wound or unwound about the spool

21. (Original) The position sensor of claim 20 wherein the spool is threadedly engaged to the frame.

22. (Original) The position sensor of claim 20 wherein the spool has a threaded extension extending therefrom and which is threadedly engaged through a threaded opening in the frame.

23. (Original) The position sensor of claim 22 wherein the linear movement of the spool through one full rotation is about one cable width.

24. (Original) The position sensor of claim 22 wherein the extension has male threads that interengage female threads formed in the frame.

25. (Original) The position sensor of claim 20 wherein a backlash mechanism creates a constant force against the threaded extension to prevent backlash in the threaded engagement between the threaded extension and the frame.

26. (Original) The position sensor of claim 23 wherein the recoil spring has an outer end affixed to the spool and an inner end that is prevented from rotating but can move linearly with respect to the frame.

27. (Original) The position sensor of claim 26 wherein inner end is affixed to a hub that is linearly movable but is prevented from rotational movement with respect to the frame.

28. (Original) The position sensor of claim 27 wherein the hub is affixed to the frame by means of at least one pin that extends between the hub and the frame and the at least one pin slidingly interfits in the hub to allow the hub to move linearly with respect to the frame.

29. (Original) A method of operating a sensor comprising a rotatable spool and a cable windable about the spool, the cable having a distal end adapted to be affixed to an object to be sensed, comprising the steps of:

linearly translating the spool in correlation to the rotational movement of the spool.

30. (Original) The method of claim 29 wherein the linear translation of the spool maintains cable windings in substantial alignment with the distal end.

31. (Original) The method of claim 29 further comprising the step of temperature compensating a signal provided by the sensor.

32. (Original) The method of claim 29 further comprising the step of offset adjusting the sensing means.

33. (Original) The sensor of claim 1 wherein the sensing means further includes a magnet in moveable cooperation with the rotating spool and adapted to translate linearly proximate the Hall effect sensor such that the Hall effect sensor provides a position related signal relative to a position of the magnet.

34. (Original) The sensor of claim 33 further comprising an adjustment mechanism to adjust an offset between the Hall effect sensor and the magnet.

35. (Original) The sensor of claim 1 wherein the sensing means includes temperature sensitive elements, the sensor further comprising a temperature compensation element.

36. (Original) The sensor of claim 35 wherein the temperature compensation element includes an electronic compensation circuit.

37. (Original) The sensor of claim 35 wherein the compensation element comprises a temperature sensitive metal.

38. (Original) The sensor of claim 33 further comprising a reference Hall-effect chip mounted in fixed relation to the magnet and a circuit operable to compensate for a difference in outputs from the Hall-effect sensor and the reference Hall-effect sensor.